Chem 1024C 20-Nov-2007   Ch 8-9 Homework [This will not be collected]

Being an Synthetic Organic Chemist, I spent the past weeks synthesizing several compounds and here's the analysis:

A. Determine the Empirical Formulae:

1.   H   2.055%
       S   32.70%
       O   65.25%

2.   C   59.96%
       H   13.42%
       O   26.62%

3.   A 3.450 g of a sample of nitrogen reacts with 1.970 g of Oxygen.

4.   An organic chemical gives the following analysis:
              5.667 g Carbon
              0.3165 g Hydrogen
              5.566 g Chlorine

5.   Cu   66.75%
       P   10.84%
       O   22.41%

6.   A compound containing only Carbon, Hydrogen and Oxygen gives the following
analysis: C   40.00%
              H   6.700%
The Molar Mass is between 115 and 125 g/mole. What is the Empirical and Molecular formulae.

7.   An organic compound containing only C, H, N and O has the following analysis
              C   49.47%
              H   5.191%
              N   28.86%
       The approximate molar mass is 194. What is the Empirical and Molecular formulae.

B. Determine the following [Show all math with canceled units and balanced equations]:

1. From the hood experiment, we learned that natural gas, Methane, will burn form carbon dioxide and water. How much water is formed from burning 50 g of Methane?

2. Sodium Hydroxide is used in rebreathers units to absorb carbon dioxide. The reaction of sodium hydroxide and carbon dioxide produces sodium carbonate and water. As we all know, since water is produced, the reaction will go to completion. How many grams of sodium hydroxide is needed to react with 1 pound of carbon dioxide?
　　　How much Sodium Carbonate is formed?

3. Baking Soda will is slightly basic and will react with vinegar to form sodium acetate, water and carbon dioxide. Show the complete balanced reaction.
　　　How many grams of vinegar is needed to react with a one pound box of baking soda?

4. 1.00 g of Hydrogen reacts with Oxygen to form water. 1.00 g of Hydrogen also can react with Nitrogen to form ammonia. Calculate the amounts of water and ammonia formed in each reaction?

5. From the above equations, 1.00 g of Hydrogen is reacted with 1.00 g of Oxygen. What reactant is in excess and by how much?

6. Aluminum reacts with Chlorine to form Aluminum Chloride. How much Aluminum Chloride is produced from 1.000 g of Aluminum assuming a 75% reaction yield?

7. Phosphorous Tri Chloride will react with water to produce Phosphorous Acid. What is the Theoretical Yield when using 5.000 g of Phosphorous Tri Chloride?